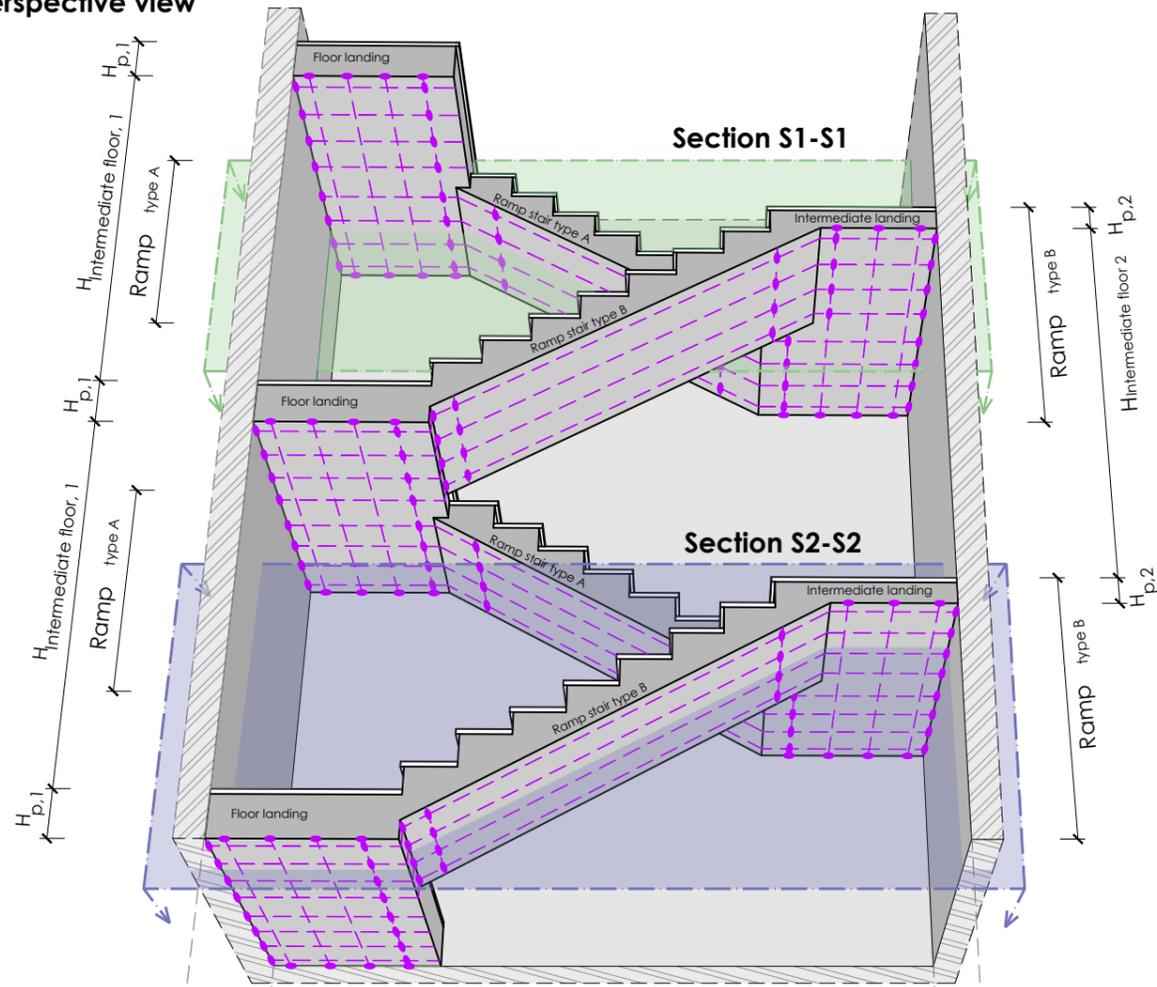


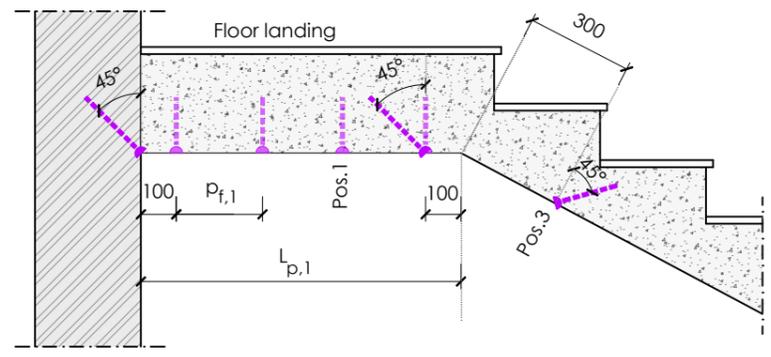


PHASE 0 - Layout and drilling

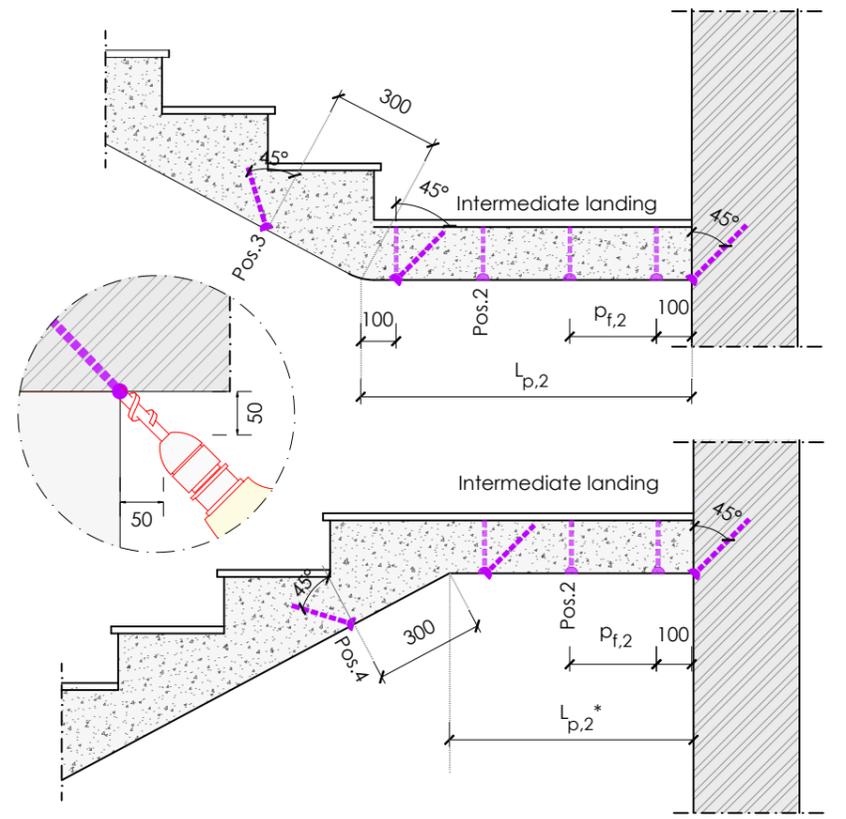
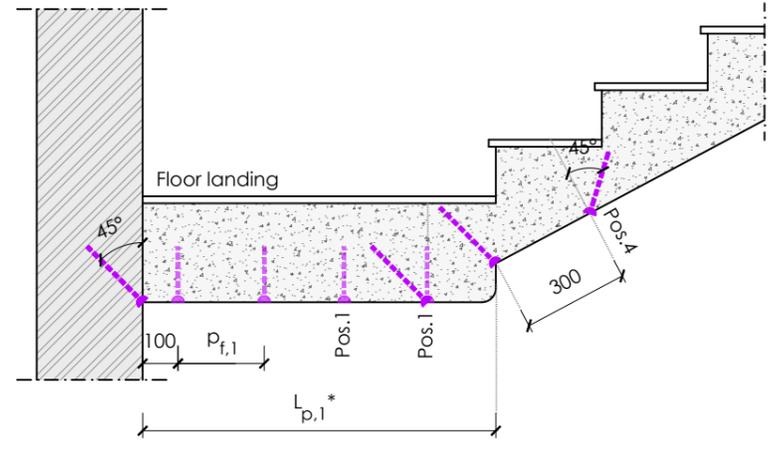
Perspective view



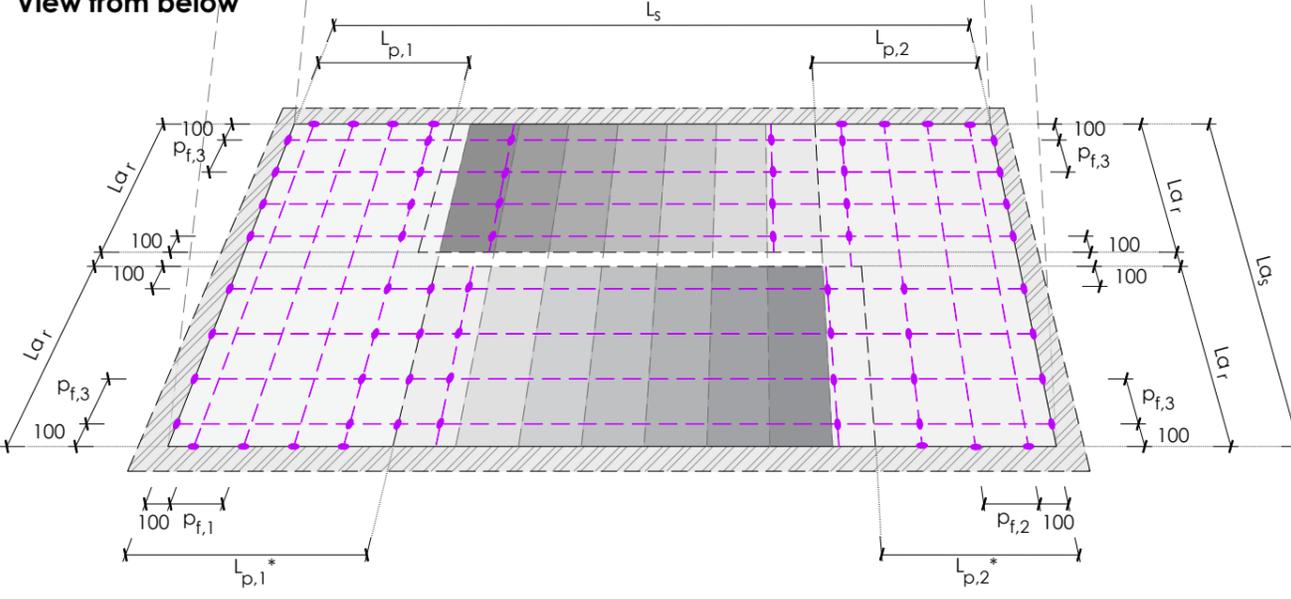
Section S1-S1 (ramp type A) (scale 1:20)



Section S2-S2 (ramp type B)



Projection of type floor
View from below



Axonometric Map

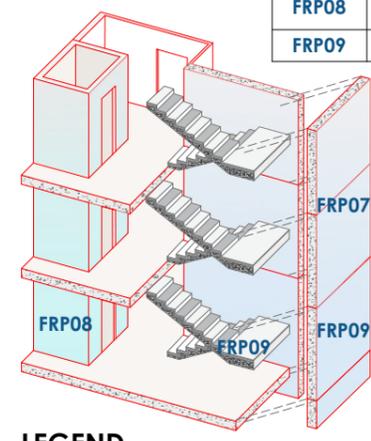


Table	Description
FRP07-09	partition in r.c.
FRP08	Elevator shaft
FRP09	r.c. staircase

LEGEND

- (L_s) Length of the staircase shaft;
- (L_{p,1}) - (L_{p,2}) Length of the landing;
- (L_{p,1}*) - (L_{p,2}*) Length of the landing at the underside;
- (La_s) Width of the staircase shaft;
- (La_r) Width of the ramp.

DESCRIPTION OF WORKS – PHASE 0

Once the layout, type, and quantity of reinforcement to be applied have been defined, follow the preliminary operational steps below before proceeding with installation:

- 0.1 After removing any existing plaster, perform mechanical cleaning of the substrate. Always check for signs of concrete degradation by testing for carbonation depth and chloride penetration. Perform rebar detection (pacometric) surveys to minimize interference between existing reinforcement and new connectors (See Phase 1).;
- 0.2 Prepare the reinforced concrete substrate, carrying out any necessary repair work on deteriorated concrete (refer to the relevant drawings for details). Round off corners with a curvature radius of ≥ 20 mm.
The application surface must not be smooth, but rough, with a roughness index between 0.3 – 0.5 mm, and must be free of oils, grease, and/or release agents. Surface cleaning should preferably be performed mechanically, using sandblasting.
To verify surface suitability, refer to the ICRI – International Concrete Repair Institute standards: CSP2–CSP3–CSP4–CSP5 for in-situ laminates and CSP6 for preformed reinforcements.
- 0.3 Mark the holes to be drilled according to the layout shown in this document.;
- 0.4 Drill holes with a diameter of Ø12/14 mm for anchoring the connectors, with countersinking of the hole to Ø16 mm and countersink depth of >10 mm. Use a rotary drill without percussion. For non-passing through connectors, the hole depth must be equal to the length of the connector plus 10 mm.;
- 0.5 Clean the holes of any debris using compressed air or a brush, while simultaneously vacuuming dust with an appropriate vacuum cleaner.

All dimensions are in mm unless otherwise specified



TABLE

FRP
09.b

BETONTEX

F.R.P. SYSTEM
STAIR RAMP REINFORCEMENT

PHASE OF INSTALLATION OF THE CONNECTION/ANCHORING SYSTEM

FIBRE
NET
composite engineering

PHASE 1 - Anchoring of connectors in C.F.R.P.

Perspective view

Projection of the typical floor
View from below

Section S1-S1 (ramp type A) (scale 1:20)

Section S2-S2 (ramp type B)

DESCRIPTION OF WORKS - PHASE 1

After defining the layout, type, and quantity of reinforcement to be applied, wait for the curing of the restoration mortar according to the product technical data sheets, and in any case, verify the moisture content of the substrate, which must be $< 10\%$, even by drilling a hole to a depth equal to the thickness of the restoration mortar. The installation of the connectors must be carried out after the preliminary surface preparation phases and hole creation (See Phase 0), proceeding with the following operational phases:

- 1.1 After thoroughly cleaning the holes (See Phase 0.5) and surfaces, apply the epoxy primer type **FB-RC01** according to the instructions in the relevant technical data sheet. Wait 1 hour but do not exceed 3 hours; during this time, proceed with the installation of the connectors according to the instructions provided in the following phases, after applying a layer of impregnation resin **FB-RC02** only at the location of the debowing;
- 1.2 Injection of resin for embedding the bars (connectors) type **FB-RC30/3**.
- 1.3 Embedding of debowed bars on one side (non-passing connectors) type **FB-TUP10-CHT1A Ø10** at a 45° angle without performing the debowing. The embedding operation must be carried out by rotating the bar to ensure perfect adhesion of the resin both on the bar itself and on the lateral surface of the hole.
- 1.4 Debowing with a 60° angle on the bars installed in Phase 1.3 and impregnation of the same with resin type **FB-RC02** to bond them to the underside of the ramp and landings.

TABLE OF CONNECTORS IN C.F.R.P.

Identification	Characteristics	
Position	No. of connectors	\varnothing_c connectors
Pos .1 Floor landing	$((L_{a,r}-200)/p_{f,3}+1) \times 4 + ((L_{p,1}-200)/p_{f,1}+1) \times 2$	10 mm
Pos .2 Intermediate landing	$((L_{a,r}-200)/p_{f,3}+1) \times 4 + ((L_{p,2}-200)/p_{f,2}+1) \times 2$	
Pos .3 Ramp type A	$((L_{a,r}-200)/p_{f,3}+1) \times 2$	
Pos .4 Ramp type B	$((L_{a,r}-200)/p_{f,3}+1) \times 3$	

MATERIAL IDENTIFICATION

(A1) FB-TUP10-CHT1A (Debowed bars in C.F.R.P.)
(B-C) FB-GV..... (Unidirectional fabric in C.F.R.P.)
(P1) FB-RC01 (Epoxy resin - Primer)
(P2) FB-RC02 (Epoxy resin - Impregnating)
(P3) FB-RC30/3 (Epoxy resin - Anchorage)

Dimensions are expressed in mm unless otherwise specified.
For the materials table, refer to drawing FRP22.

FB 03 DWG 193 EN 01

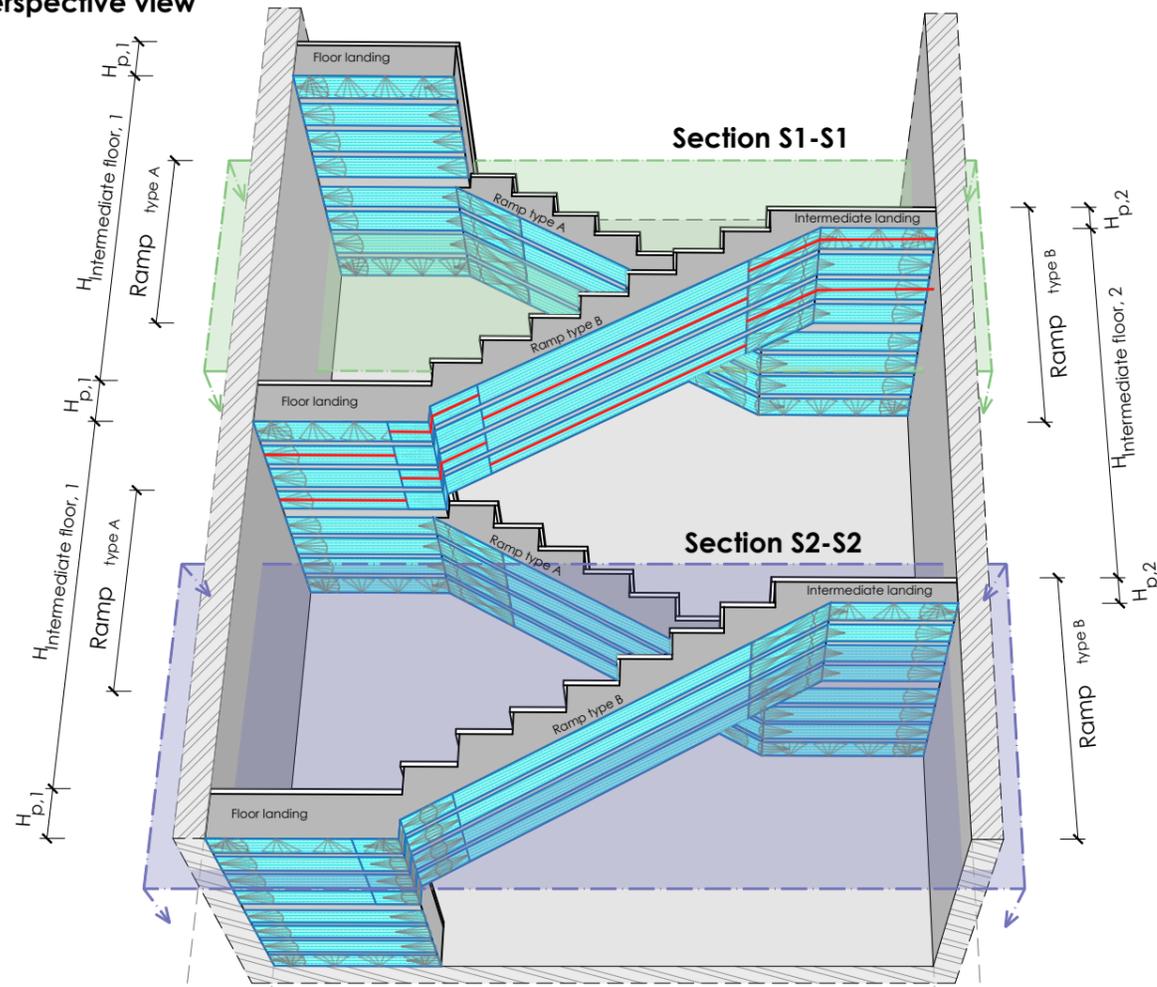
© FIBRE NET SPA - THIS DOCUMENT IS THE PROPERTY OF FIBRE NET SPA. ANY USE, IN WHOLE OR IN PART, OF THE CONTENTS INCLUDED IN THIS DOCUMENT, INCLUDING REPRODUCTION, MODIFICATION, DISTRIBUTION OR DISSEMINATION WITHOUT THE WRITTEN AUTHORIZATION OF FIBRE NET SPA, IS PROHIBITED

AREA DOWNLOAD

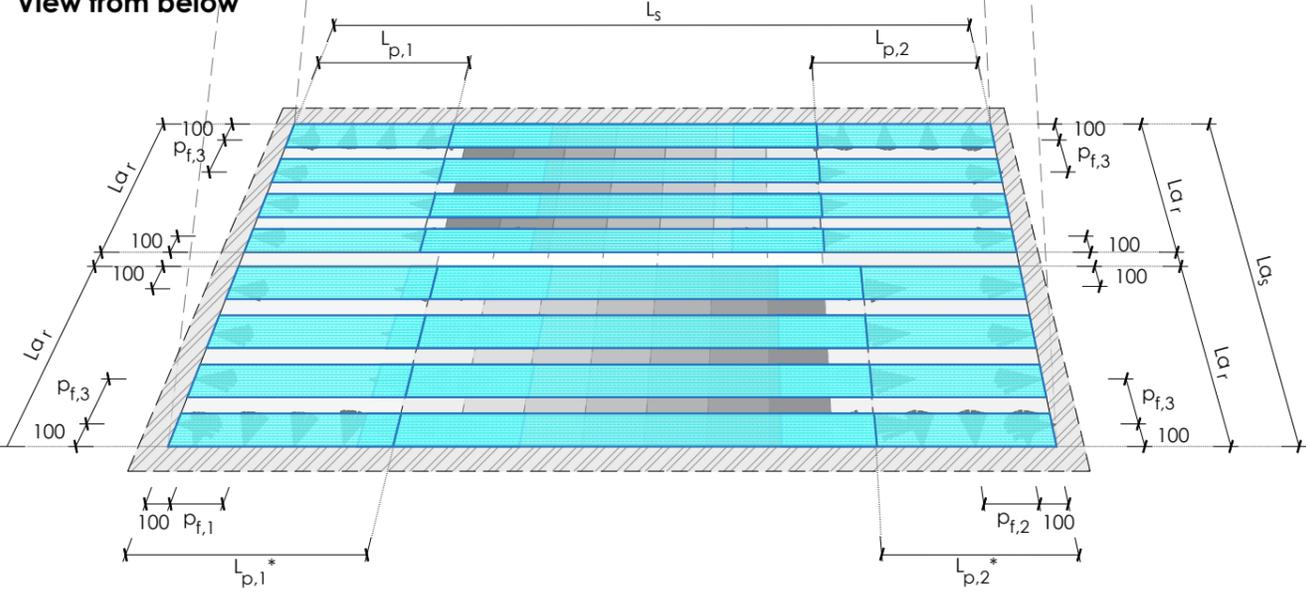


PHASE 2 - Installation of reinforcement systems

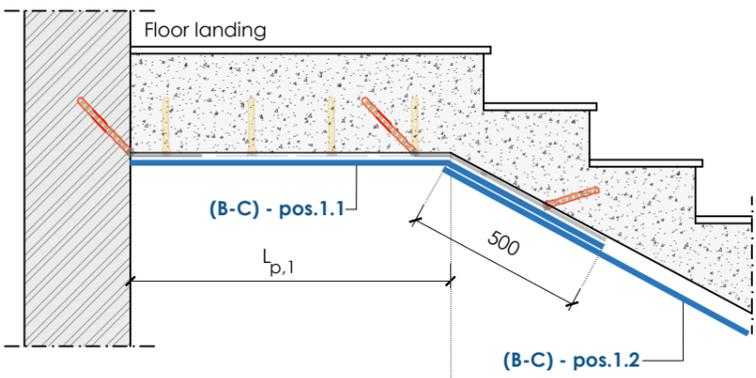
Perspective view



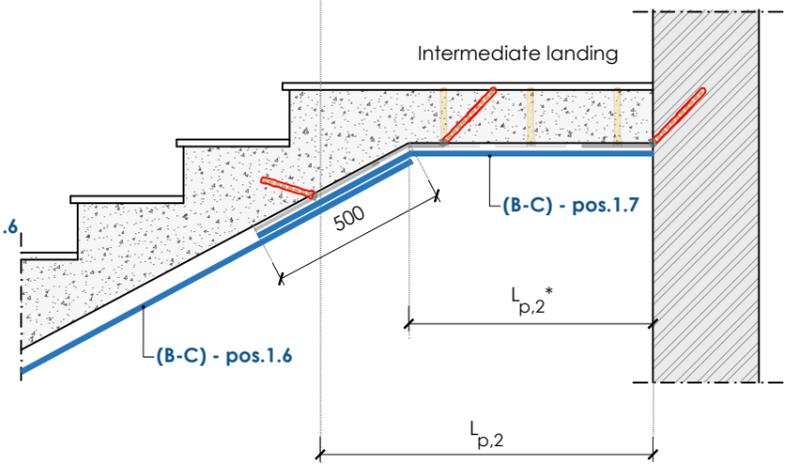
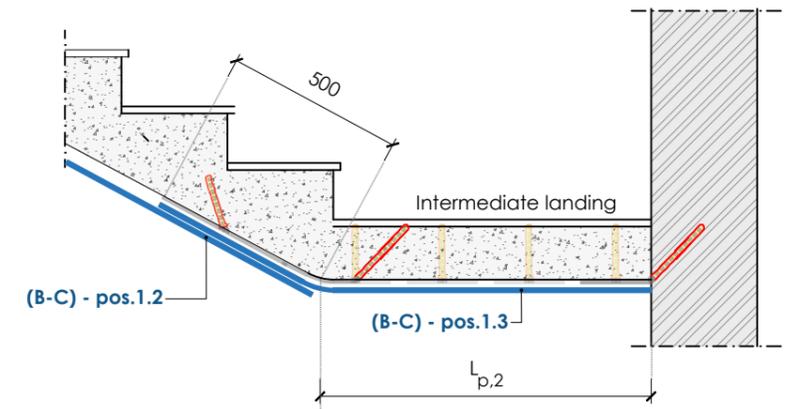
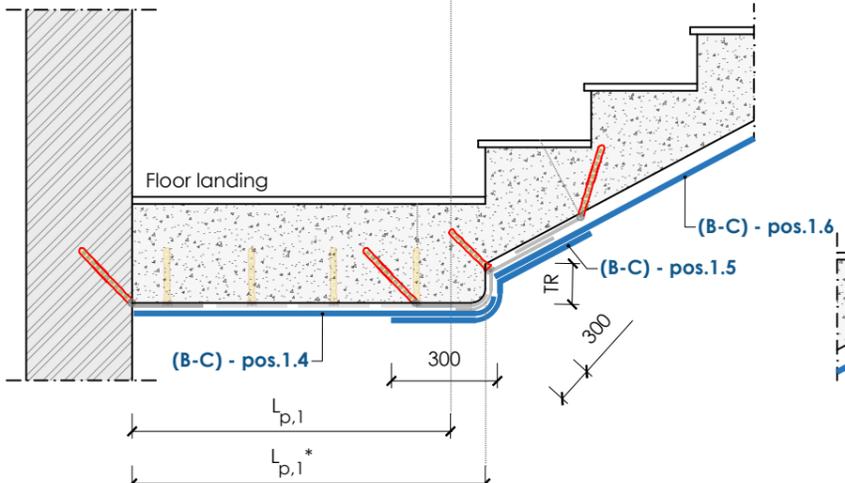
Projection of the typical floor
View from below



Section S1-S1 (ramp type A) (scale 1:20)



Section S2-S2 (ramp type B)



DESCRIPTION OF WORKS - PHASE 2

Once the arrangement, type, and quantity of reinforcement to be applied have been defined, the installation must be carried out according to the following operational stages::

2.1 After applying a layer of epoxy resin primer **FB-RC02**, install the CFRP reinforcements of type **FB-GV.....-.....** longitudinally on the underside of the ramp and landings (pos.1), ensuring no formation of wrinkles, folds, or air bubbles; use a bubble-breaking impregnation roller to facilitate this operation. After placing the fabrics, apply a second layer of epoxy resin primer **FB-RC02** and continue rolling with the bubble-breaking roller until the fibers are fully impregnated;

C.F.R.P. FABRIC TABLE

Id	Characteristics			
	N. strips	Lunghezza	Width br	N. layers
Pos 1.1	((L _{a,r} -200)/p _{f,3} +1) x n. ramps	L _{p,1} + 500	200 mm	to be defined
Pos 1.2		Ramp length		
Pos 1.3		L _{p,2} + 500		
Pos 1.4		L _{p,1} *		
Pos 1.5		300 + TR + 300		
Pos 1.6		Ramp length		
Pos 1.7		L _{p,2} * + 500		

MATERIAL IDENTIFICATION

- (A1) FB-TUP10-CHT1A (Debowed CFRP Bars)
- (B-C) FB-GV.....-..... (Unidirectional CFRP Fabric)
- (P1) FB-RC01 (Epoxy Resin - Primer)
- (P2) FB-RC02 (Epoxy Resin - Impregnating Resin)
- (P3) FB-RC30/3 (Epoxy Resin - Grouting Resin)

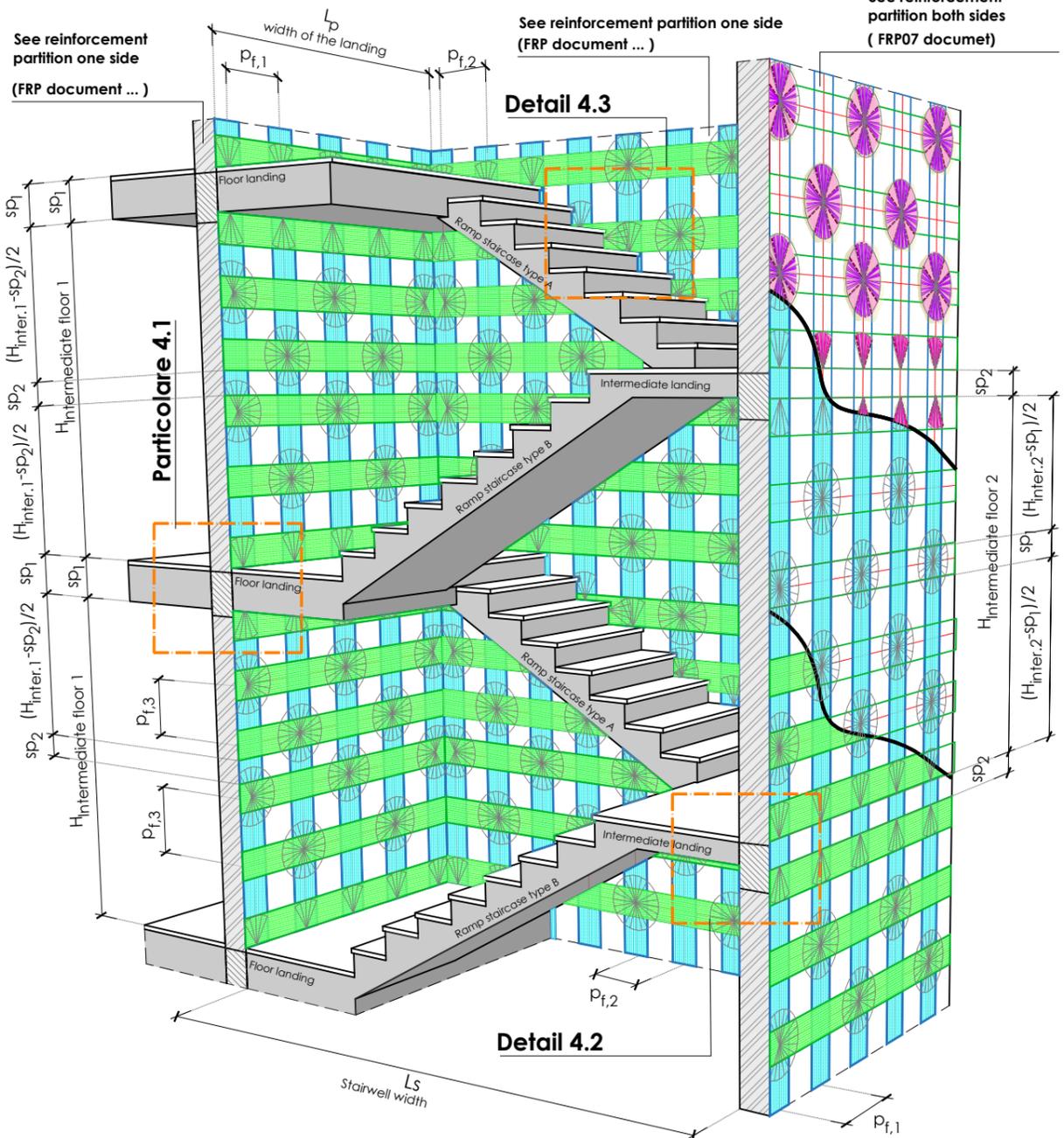
The measurements are expressed in mm unless otherwise specified
For the materials table, refer to drawing FRP22





PHASE 4 - Staircase Shaft Wall Reinforcement

Perspective view

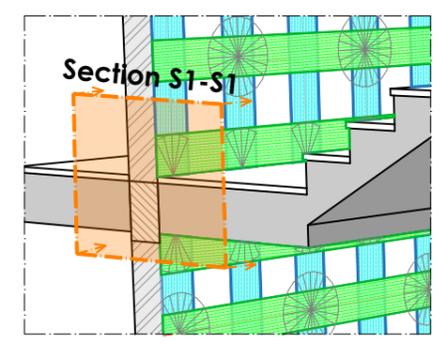


DESCRIPTION OF WORKS - PHASE 4

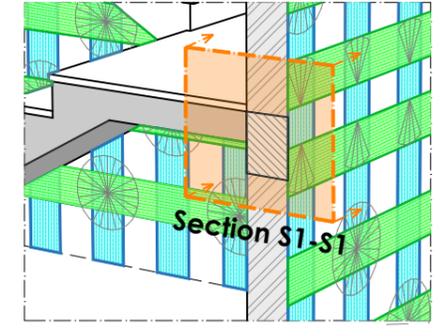
If reinforcement of the perimeter walls of the stairwell is necessary, refer to the drawings concerning the shear walls reinforced on one side and on two sides (Drawings FRP.....) for the phases of layout, anchoring, and fabric placement. Below are the construction details for the grouting of single-sided (non-passing through connectors such as FB-TUP10-CHT1A) and double-sided (passing through connectors such as FB-TUP10-CHT2A) de-bowed bars, as well as the placement of unidirectional CFRP fabrics, such as FB-GV.....-....., in both vertical and horizontal directions, corresponding to the following connection nodes:

- 4.1 connection of the shear wall of the stairwell (wall with reinforcement on one side) with the floor landing;
4.2 connection of the shear wall of the stairwell (wall with reinforcement along both sides) with the resting landing;
4.3 connection of the shear wall of the stairwell with the staircase ramp.

Construction Detail 4.1 Perspective view



Construction Detail 4.2 Perspective view



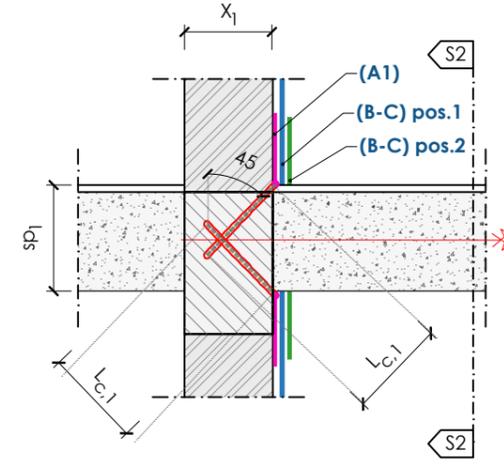
Construction Detail 4.3 Perspective view



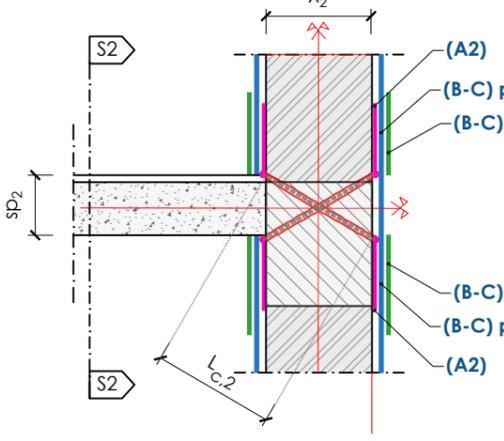
MATERIAL IDENTIFICATION

- (A1) FB-TUP10-CHT1A (Debowed bars in C.F.R.P.)
(A2) FB-TUP10-CHT2A (Debowed bars in C.F.R.P.)
(B-C) FB-GV.....-..... (Unidirectional fabric in C.F.R.P.)
(P1) FB-RC01 (Epoxy resin - Primer)
(P2) FB-RC02 (Epoxy resin - Impregnating agent)
(P3) FB-RC30/3 (Epoxy resin - Grouting)

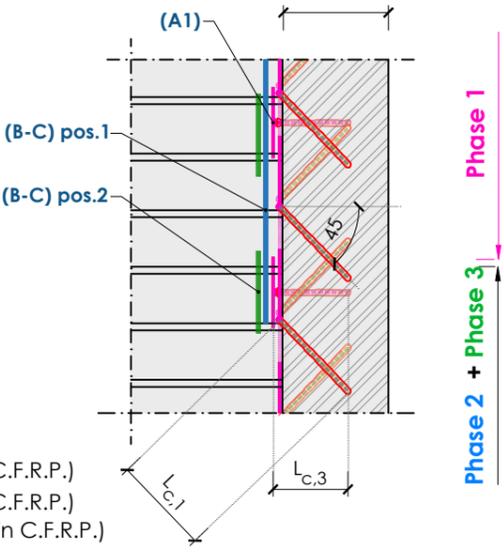
Section S1-S1 (scale 1:20)



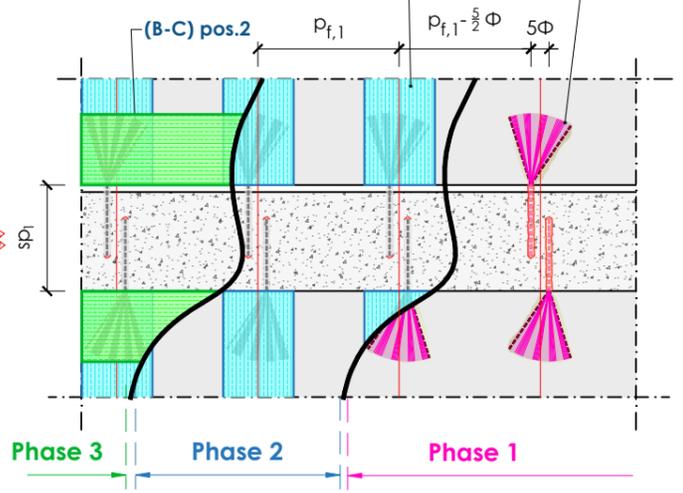
Section S1-S1 (scale 1:20)



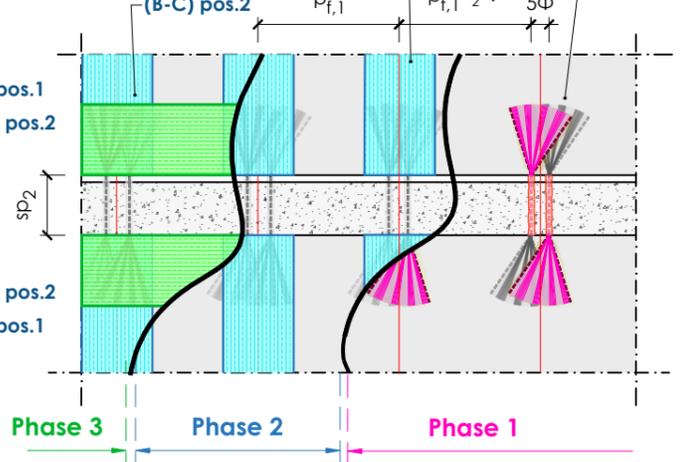
Section S1-S1 (scale 1:20)



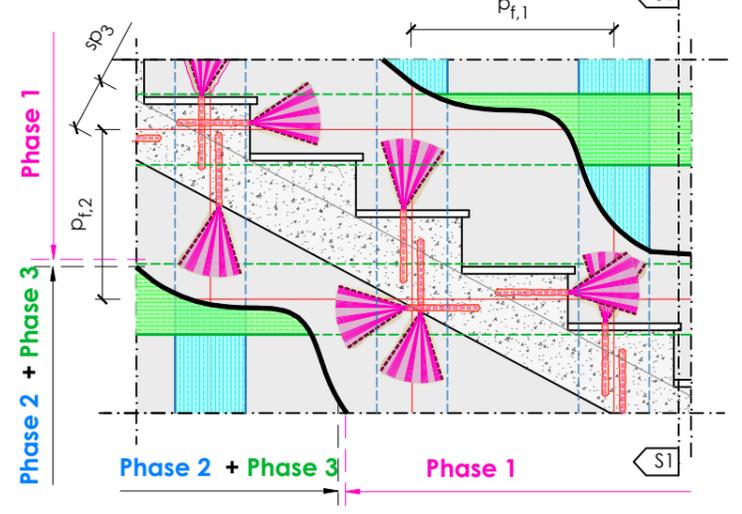
Section S2-S2 (scale 1:20)



Section S2-S2 (scale 1:20)



Section S2-S2 (scale 1:20)



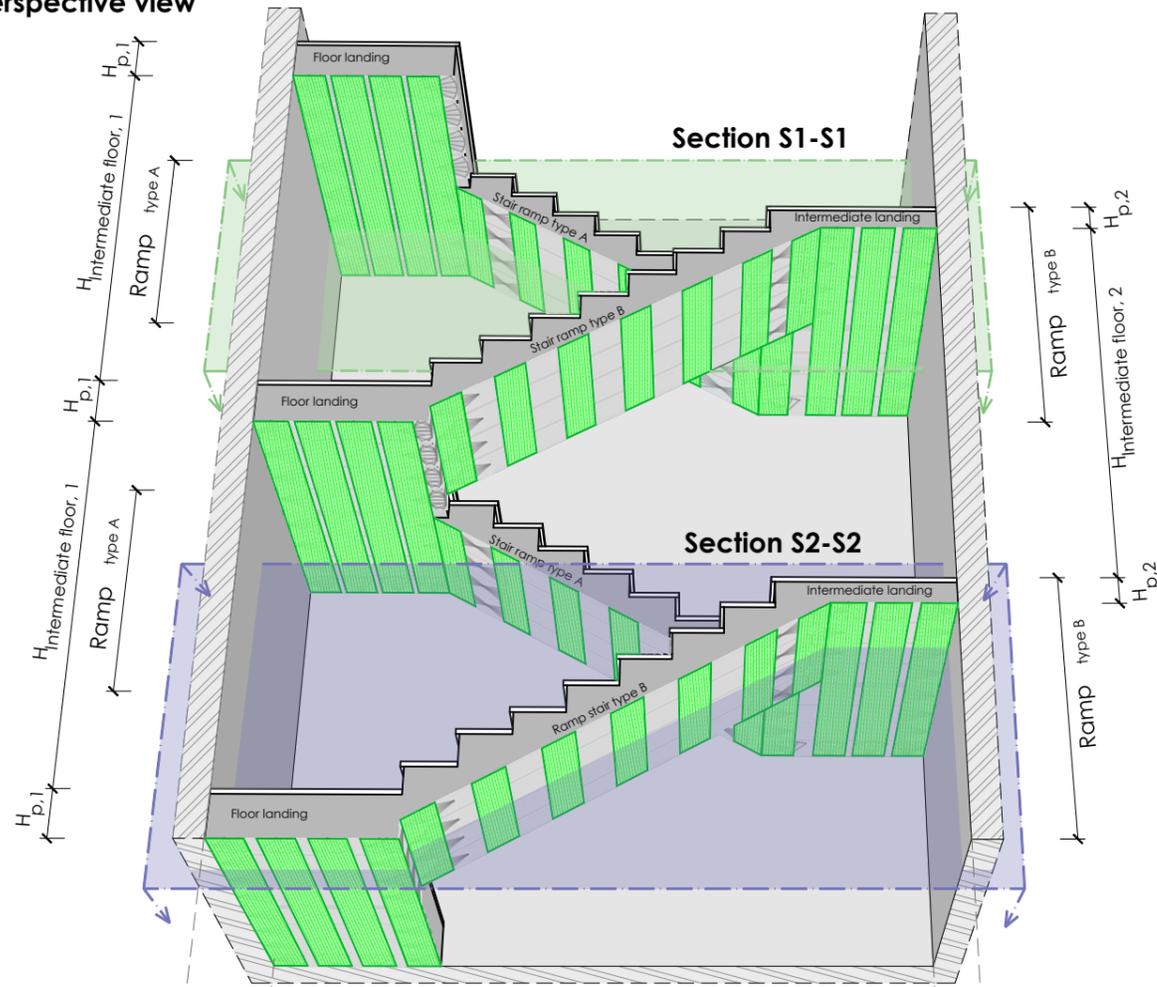
Dimensions are expressed in mm unless otherwise specified. For the materials table, refer to drawing FRP22



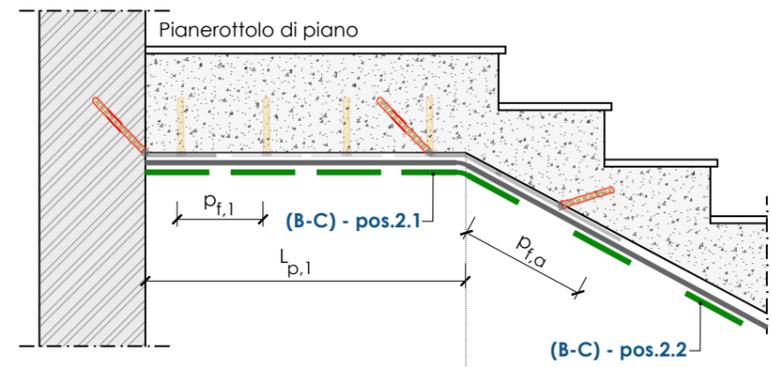


PHASE 3 - Installation of reinforcement systems

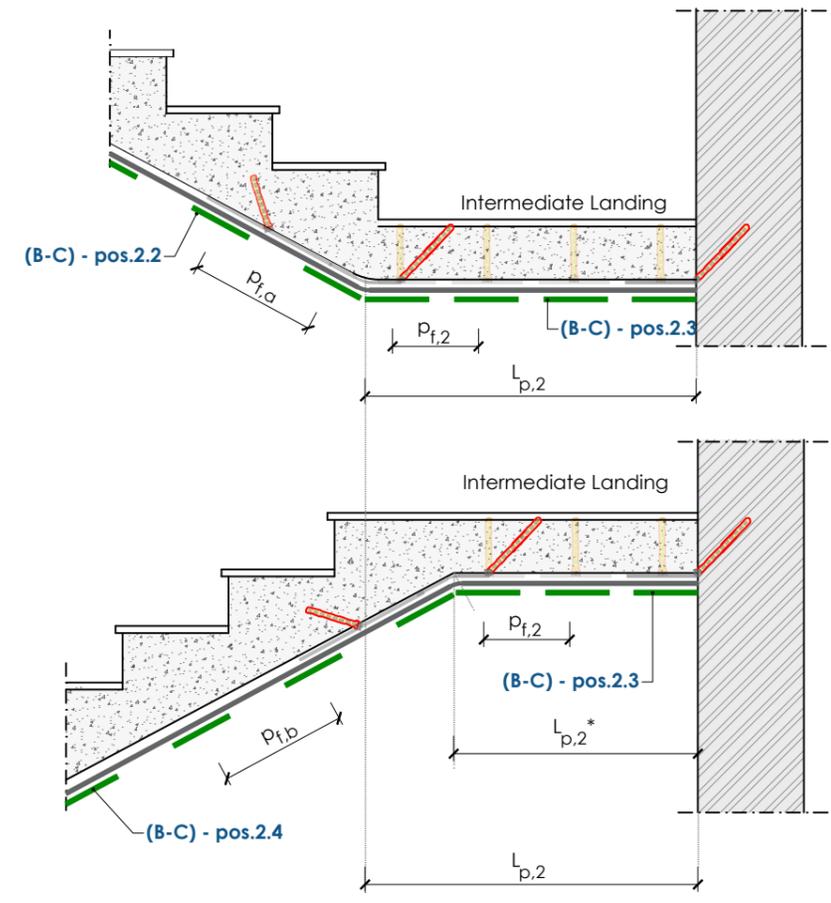
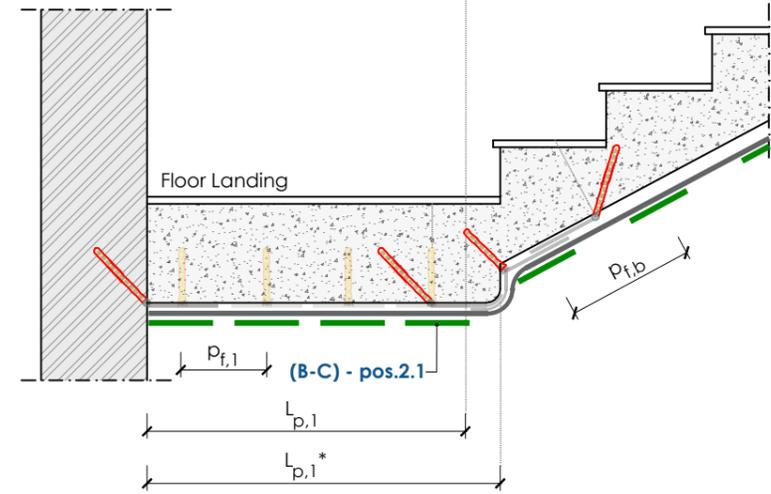
Perspective view



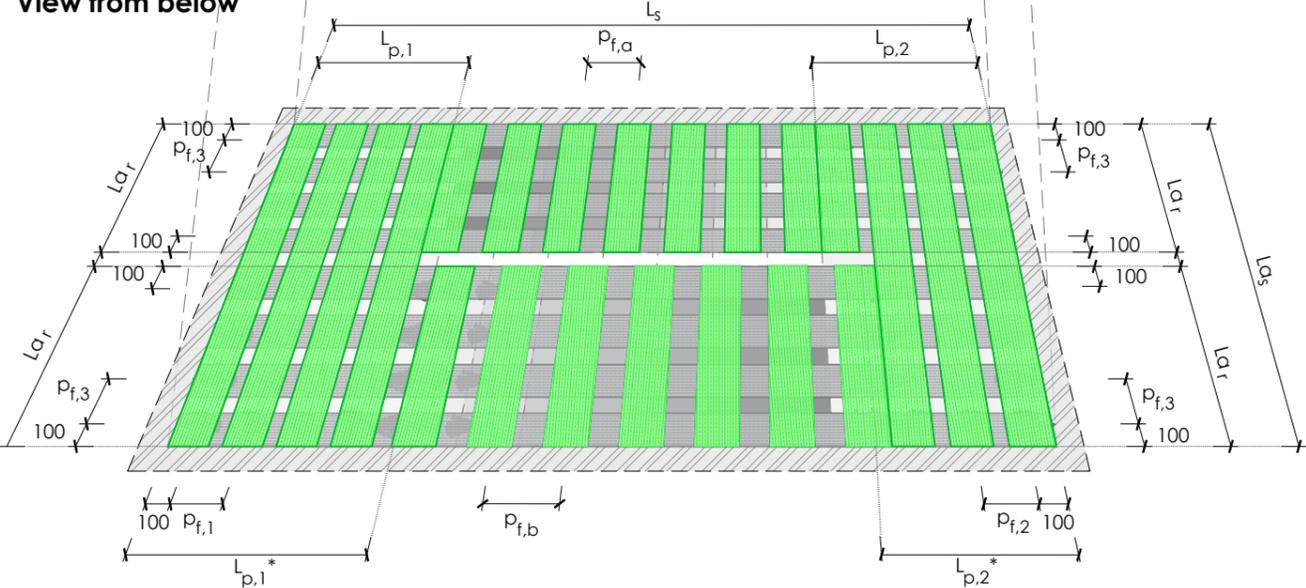
Section S1-S1 (ramp type A) (scale 1:20)



Section S2-S2 (ramp type B) (scale 1:20)



Projection of typical floor
View from below



DESCRIPTION OF THE WORKS - PHASE 3

Once the arrangement, type, and quantity of fabrics to be applied have been defined, the installation must be carried out according to the following operational steps:

- 3.1 After placing the CFRP reinforcements type **FB-GV.....-.....** longitudinally on the underside of the ramps and landings (pos.1), proceed in a similar manner with the installation of the CFRP reinforcements type **FB-GV.....-.....** placed transversely (pos.2)
- 3.2 If necessary, repeat steps 1 and 2 for all additional layers required by the project, to be applied alternately (pos.1, pos.2, pos.1, pos.2,). Proceed with a second layer of impregnating resin **FB-RC02** and continue rolling with the bubble-breaking roller until complete impregnation of the fibers is achieved.
- 3.3 Apply quartz sand by sprinkling on the surface of the composite while the resin is still fresh, to allow proper bonding of the finishing plaster.

TABLE OF C.F.R.P. FABRICS

Id		Characteristics		
Position	N. strips	length	width b _f	N. layers
Pos 2.1	$((L_{p,1}-200)/p_{f,1}+1)$	L _p	200 mm	to be defined
Pos 2.2	$((L-200)/p_{f,a}+1)$	L _{a,r}		
Pos 2.3	$((L_{p,2}-200)/p_{f,2}+1)$	L _p		
Pos 2.4	$((L-200)/p_{f,b}+1)$	L _{a,r}		

MATERIAL IDENTIFICATION

- (A1) FB-TUP10-CHT1A (Debowed CFRP Bars)
- (B-C) FB-GV.....-..... (Unidirectional CFRP Fabric)
- (P1) FB-RC01 (Epoxy Resin - Primer)
- (P2) FB-RC02 (Epoxy Resin - Impregnant)
- (P3) FB-RC30/3 (Epoxy resin - anchoring)

The measurements are expressed in mm unless otherwise specified. For the materials table, refer to the FRP22 drawing.

